

FIG.1

PREDICTED vs ACTUAL COST COMPARISON  
OF  
TECHNOLOGY COST ESTIMATE WORKSHEET

| TECHNOLOGY  | NAME       | PREDICTED | ACTUAL  | % DELTA |
|-------------|------------|-----------|---------|---------|
| CM4L 3LM    | OMNI       | \$872     | \$833   | 4.7%    |
| CM4LP 3LM   | PHEONIX    | \$805     | \$856   | -6.0%   |
| CM5S 4LM    | MUSTANG    | \$1,188   | \$1,121 | 6.0%    |
| CM5S1 5LM   | RACER      | \$1,236   | \$1,227 | 0.7%    |
| CM5X 4LM    | APACHE     | \$1,191   | \$1,152 | 3.4%    |
| CM5X2 4LM   | FURY       | \$1,248   | \$1,167 | 6.9%    |
| CM6S 4LM    | HURRICANE  | \$1,322   | \$1,340 | -1.3%   |
| CM6S2 4LM   | TIGGER     | \$1,407   | \$1,299 | 8.3%    |
| CM6S2 5LM   | SC / 98    | \$1,560   | \$1,469 | 6.2%    |
| CM6SF 4LM   | PYTHON     | \$1,531   | \$1,437 | 6.5%    |
| CM6SF 5LM   | LONGTRAIL  | \$1,816   | \$1,691 | 7.4%    |
| CM6X 4LM    | TYPHOON    | \$1,704   | \$1,670 | 2.0%    |
| CM7S 6LM    | LONESTAR   | \$2,464   | \$2,607 | -5.5%   |
| CM7SF 3LM   | COMMANDER  | \$1,918   | \$2,020 | -5.0%   |
| CM8S 4LM    | BLIZZARD   | \$2,238   | \$2,240 | -0.1%   |
| SIGE6SF     | COPERNICUS | \$2,809   | \$2,726 | 3.0%    |
| ICEC8S2 6LM | MAJESTIC*  | \$3,214   | \$3,325 | -3.3%   |
| ICEC9S 7LM  | MAKO**     | \$3,870   | \$3,534 | 9.5%    |

\* Predictive Cost Estimated 12 Months Prior to Actual

\*\* Predictive Cost Estimated 18 Months Prior to Actual

FIG.2

# TECHNOLOGY COST ESTIMATE WORKSHEET

FOR THE FOLLOWING TECHNOLOGIES:

CM4S, CM4L, CM5L, CM5S, CM5S6, CM6X, CM5X2, CM6S, CM6S2, CM5SF, CM6X1, CM7S,  
CM7SF, CM8S, CS019S, CS019S2, CM9SF, CM8SF, ICEC7S, ICEC8S2, CS0110S

TECHNOLOGY  ☐ ← 301  
PHOTO GROUNDRULE  ☐ ← 302 300  
CURRENTLY IN PRODUCTION Y OR N  ☐ ← 303  
IF "N" 10% CONTINGENCY ADDED

FEOL BASE COST EXCLUDES: BR, KV, TAILORS, DUAL GATE AND OP LEVELS FULL CAPACITY COST MATURE FULL CAPACITY COST

FEOL BASE COST  313  314

FEOL OPTIONAL LEVELS:

| 311                            | Y or N                   | # OF MASK 312        | 315                    | 316                    |
|--------------------------------|--------------------------|----------------------|------------------------|------------------------|
| BR RESISTOR                    | <input type="checkbox"/> | <input type="text"/> | <input type="text"/> 0 | <input type="text"/> 0 |
| KV LEVEL                       | <input type="checkbox"/> | <input type="text"/> | <input type="text"/> 0 | <input type="text"/> 0 |
| TAILOR VTS                     | <input type="checkbox"/> | <input type="text"/> | <input type="text"/> 0 | <input type="text"/> 0 |
| DUAL GATE                      | <input type="checkbox"/> | <input type="text"/> | <input type="text"/> 0 | <input type="text"/> 0 |
| OP RESISTOR                    | <input type="checkbox"/> | <input type="text"/> | <input type="text"/> 0 | <input type="text"/> 0 |
| EDRAM OPTION:<br>(DT,AE,AW,PP) | <input type="checkbox"/> | <input type="text"/> | <input type="text"/> 0 | <input type="text"/> 0 |

FEOL OPTIONAL COST  319  317  320  318

TOTAL FEOL COST WITH OPTIONS   0  0

BEOL BASE COST EXCLUDES: MC, MIM CAPACITOR, AND TD LEVELS BASED ON 4 THIN LEVELS OF METAL FULL CAPACITY COST MATURE FULL CAPACITY COST

BEOL BASE COST  321  322 370

BASE COST = 4 THIN LEVELS OF METAL

DELETE METAL LEVELS:  
For products with LESS than 4LM  
Indicate type of metal and # of levels

| 323          | Y or N                   | # OF LOM 324         | 325                    | 326                    |
|--------------|--------------------------|----------------------|------------------------|------------------------|
| Aluminum     | <input type="checkbox"/> | <input type="text"/> | <input type="text"/> 0 | <input type="text"/> 0 |
| Thin Copper  | <input type="checkbox"/> | <input type="text"/> | <input type="text"/> 0 | <input type="text"/> 0 |
| Thick Copper | <input type="checkbox"/> | <input type="text"/> | <input type="text"/> 0 | <input type="text"/> 0 |

→ 25/level for Cu  
→ 60/level for Cu

\*Shaded boxes need input

FIG.3A

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ADD META LEVELS:  
For products with MORE than 4LM  
Indicate type of metal and # of levels

327 Y or N # OF LOM TO ADD 328

Aluminum  
Thin Copper  
Thick Copper

25/level for Cu  
60/level for Cu

BEOL BASE COST WITH LEVEL OF METAL ADJUSTMENTS → 331

BASE COST ADDER FOR COPPER Y or N 333

ADDITIONAL BEOL LEVELS:  
25/LEVEL ADDER FOR CU TECHNOLOGY

MC LEVEL  
MIM CAPACITOR  
TD LEVEL Y or N 336

ADDITIONAL BEOL LEVELS 339

TOTAL BEOL COST WITH OPTIONS 341

329 330  
332 334 335  
337 338  
340 342

| COST SUMMARY  |                               | 390                             |
|---|-------------------------------|---------------------------------|
|   | PLAN<br>FULL CAPACITY<br>COST | MATURE<br>FULL CAPACITY<br>COST |
| BASE COST   | \$0 313                       | \$0 314                         |
| OPTIONAL COST                                       | \$0 317                       | \$0 318                         |
| RAW WAFER   | \$0 351                       | \$0 352                         |
| SUPER COMMON  | \$0 353                       | \$0 354                         |
| SUB TOTAL   | \$0 355                       | \$0 356                         |
| CONTINGENCY OF 10%<br>(NOT CURRENTLY IN PRODUCTION) | \$0 357                       | \$0 358                         |
| TOTAL PREDICTED COST                                | \$0 359                       | \$0 360                         |

\*Shaded boxes need input

FIG.3B

FIG.3A

FIG.3B

FIG.3C

EQUATIONS FOR TECHNOLOGY COST ESTIMATE WORKSHEET

| FEATURE       | FULL CAPACITY<br>COST EQUATION | MATURE COST<br>EQUATION | WHERE:   | HOW<br>DERIVED         |
|---------------|--------------------------------|-------------------------|--|------------------------|
| FEOL BASE     | $Y=272X^{-0.53}$               | $Y=241X^{-0.493}$       | $Y = \text{FEOL Base Cost}$<br>$X = \text{Groundrule}$       | Least Squares Analysis |
| BEOL BASE     | $Y=417X^{-0.486}$              | $Y=388X^{-0.461}$       | $Y = \text{BEOL Base Cost}$<br>$X = \text{Groundrule}$       | Least Squares Analysis |
| BR RESISTOR   | $Y=15.1X^{-0.362}$             | $Y=13.5X^{-0.352}$      | $Y = \text{BR Resistor Cost}$<br>$X = \text{Groundrule}$     | Least Squares Analysis |
| KV LEVEL      | $Y=15.5X^{-0.297}$             | $Y=12.5X^{-0.489}$      | $Y = \text{KV Level Cost}$<br>$X = \text{Groundrule}$        | Least Squares Analysis |
| TAILOR VTS    | $Y=49.8X^{-0.048}$             | $Y=45.9X^{-0.0302}$     | $Y = \text{Tailor VTs Cost}$<br>$X = \text{Groundrule}$      | Least Squares Analysis |
| DUAL GATE     | $Y=38.2X^{0.803}$              | $Y=33.7X^{0.815}$       | $Y = \text{Dual Gate Cost}$<br>$X = \text{Dual Gate Levels}$ | Least Squares Analysis |
| OP RESISTOR   | $Y=19.8X^{-0.512}$             | $Y=17.9X^{-0.502}$      | $Y = \text{OP Resistor Cost}$<br>$X = \text{Groundrule}$     | Least Squares Analysis |
| MC LEVEL      | $Y=58.8X^{-0.597}$             | $Y=53.9X^{-0.584}$      | $Y = \text{MC Level Cost}$<br>$X = \text{Groundrule}$        | Least Squares Analysis |
| METAL LEVELS  | $Y=111X^{-0.302}$              | $Y=103X^{-0.282}$       | $Y = \text{Metal Level Cost}$<br>$X = \text{Groundrule}$     | Least Squares Analysis |
| MIM CAPACITOR | $Y=34.2X^{-0.523}$             | $Y=30.8X^{-0.533}$      | $Y = \text{MIM Cap Cost}$<br>$X = \text{Groundrule}$         | Least Squares Analysis |
| TD LEVEL      | 85                             | 77                      | NA   | Direct Measurement     |
| EDRAM         | 475                            | 450                     | NA   | Direct Measurement     |
| CU ADDER      | 100                            | 80                      | NA   | Direct Measurement     |

FIG.4

TECHNOLOGY COST MODEL OVERVIEW

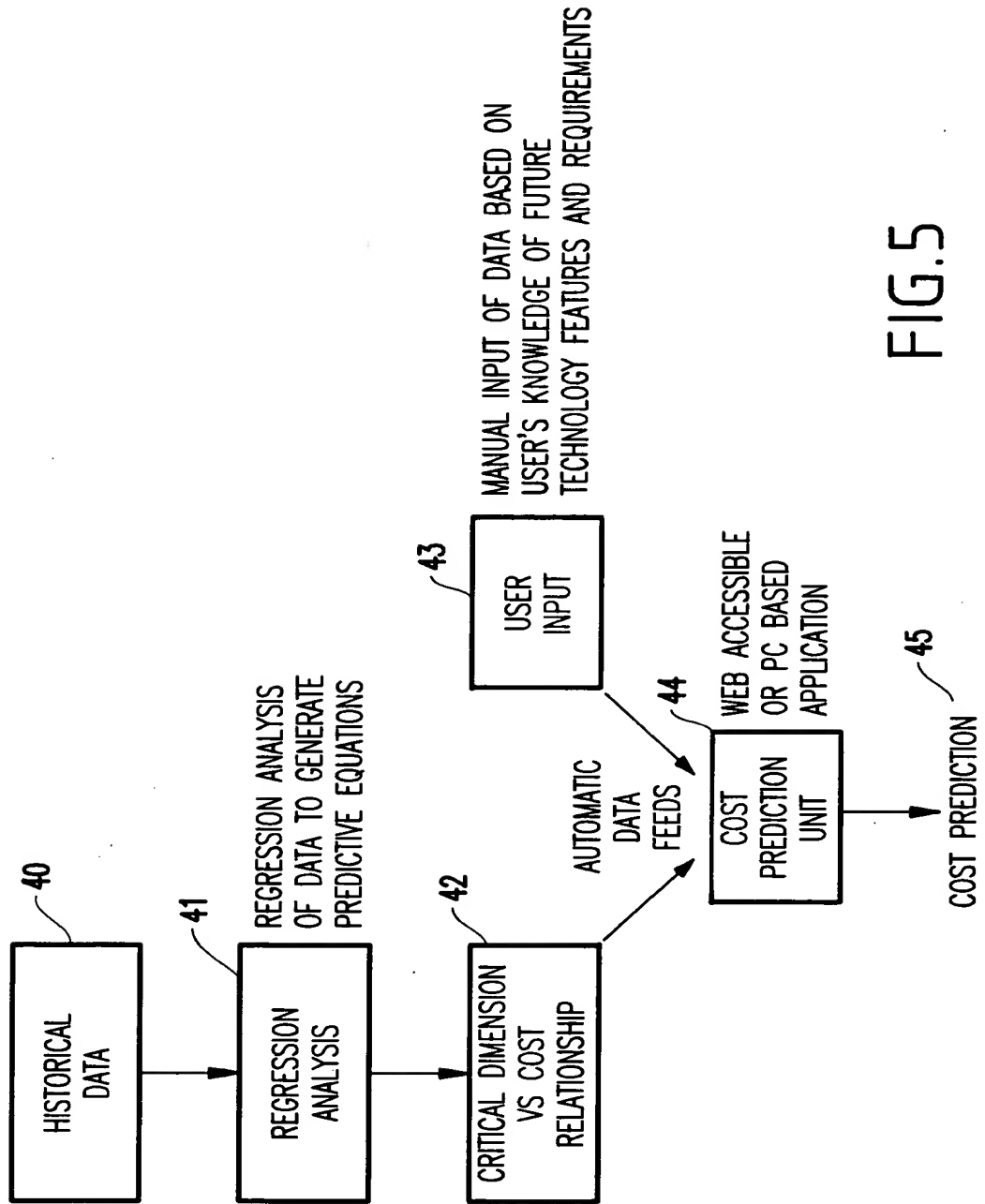


FIG.5

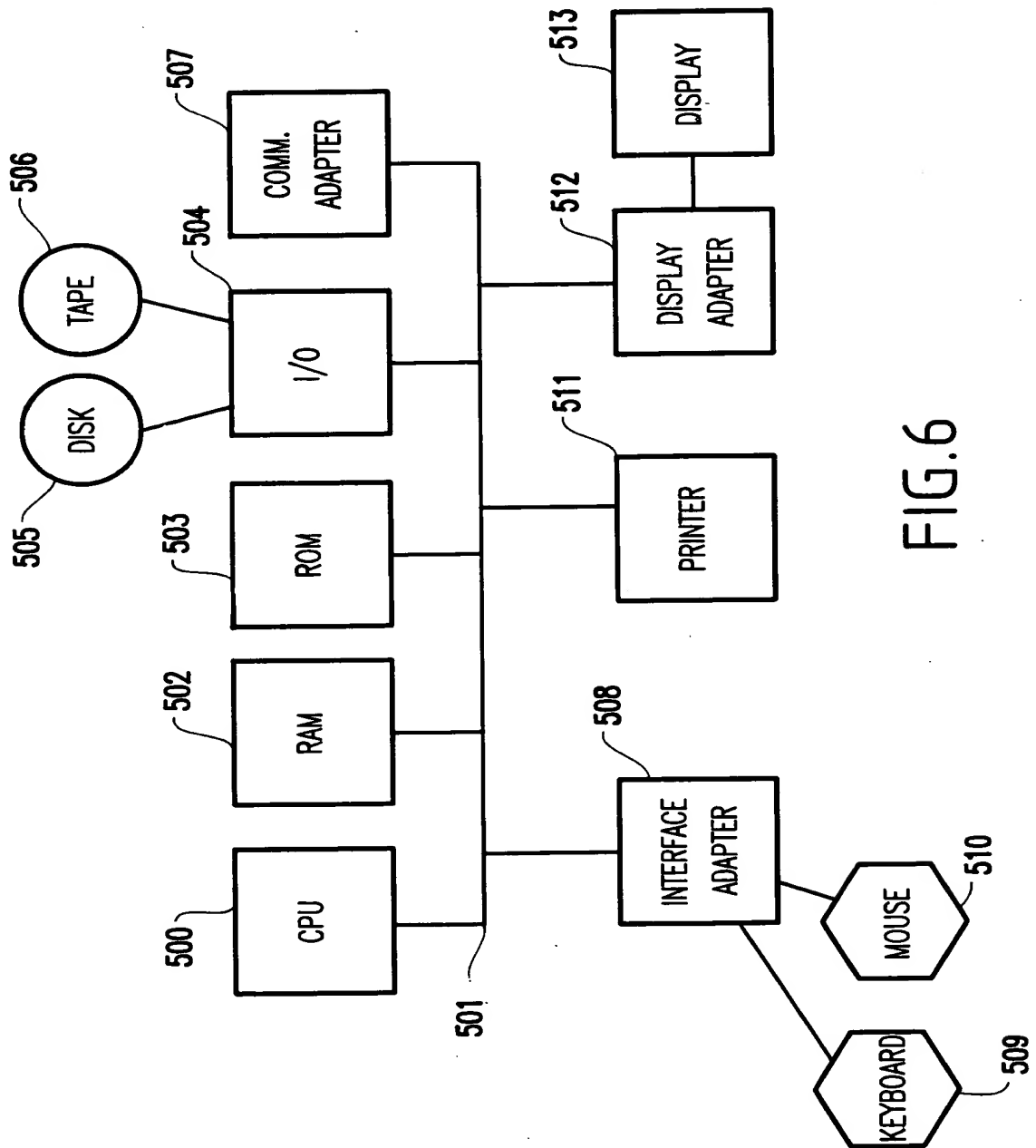


FIG. 6

FIG. 6 is a block diagram of a computer system architecture.